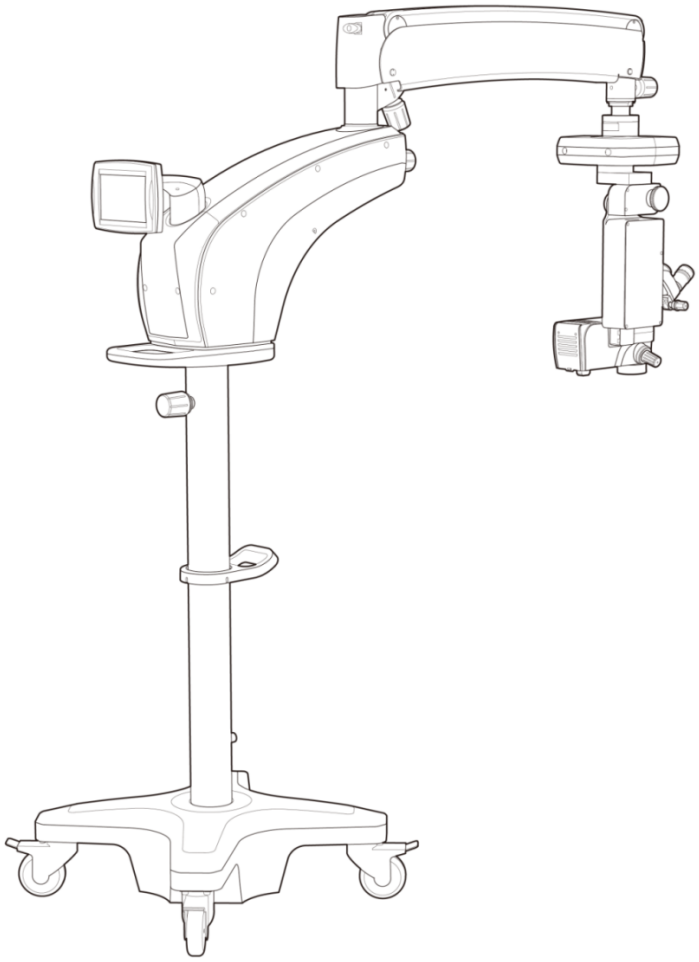
User Manual

OPERATION MICROSCOPE

HOM-700



Huvitz Re:define, Re+create

Caution

This product may malfunction due to the electromagnetic wave that is generated by mobile phone, two-way radio and wirelessly controlled machinery. Please keep this product away from device that affects this product. It was confirmed that this equipment complies with the restriction on the medical devices by undergoing Electromagnetic Compatibility test. This restriction was designed to provide adequate protection against hazardous interception when installing typical medical device.

The contents of this user manual were inspected carefully, and thus we would like to believe that the contents are accurate in general. However, HUVITZ shall not assume any responsibility for any latent mistake or omission that results from the use of the information that is included in this user manual.

HUVITZ retains the right to modify this product or this product's specifications any time without making special notification, and this document may not be renewed to factor in such a modification.

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1. Introduction

1.1. Purpose of use

HUVITZ surgical microscope HOM-700 is a multi-dimensional microscope that is designed in a way that the view desired can be modified via scale factor conversion at ophthalmology during surgery process. This was made for office, hospital or other medical institution. Only doctor, nurse or medical professional who has read the user manual and who underwent adequate training should operate it. Condition for installation should be suitable for precision surgery. For example, it should be operated at a place with low vibration and at clean environment.

1.2. Product overview

Ophthalmic optical microscope HOM-700 classifies mainly into two parts. It is comprised of the optical zone that is suitable for ophthalmology surgery and of the stand that is insensitive to vibration.
Optical zone is comprised of two; observational optical zone and illuminating optical zone.
Observational optical zone is a multi-dimensional microscope and it includes the following; electric zoom with scale factor of zoom ratio of 6:1 that gets converted, double lighting part of the 0 degree, 6 degrees, working distance 200mm for object lens, Eyepiece with 10X 21mm visual field, and tilting binocular observation part which are provided by default in the basic package. Option includes camera port with 80:20 light quantity distributed.
Illuminating optical zone is comprised of the 0 degree lighting for retina reflection and 6 degree light for observing the periphery. At this time, ultraviolet ray shielding filter that is used commonly is included, and this is used to minimize injury to the retina resulting from ultraviolet ray.
Stand is comprised of the conveying unit that moves up to 50mm in XYZ axes, tilting rotation controlling monitor, support arm where optical zone can be attached up to 5.0kg and that enables perpendicular movement up to 795mm~1390mm from the ground, and support part that is designed to be insensitive to vibration. Four caster wheels of the support part facilitate movement in the surgery room. Support part includes electronic and electric control device of the motor drive when it comes to the surgery microscope. User controls surgery microscope optical zone's conveying unit using mostly foothold control panel.
Twelve different functions of the XYZ axes driving part and optical zone such as adjustment of halogen light quantity through foothold control panel and resetting of XYZ axes' initial location can be controlled.
Basic user value memory up to 4 people through display panel, foothold control panel's button memory value modification, XYZ axes and zoom part speed control and foothold control panel's initial value modification are enabled.

1.3. Grade classification and matters included

(1) Product name, model name
Ophthalmic optical microscope(OPERATION MICROSCOPE HOM-700)

(2) Classification of product
EU: Class I according to Annex IX(Rule 12) of Medical Device Directive 93/42/EEC as amended by 2007/47/EC
MFDS: Class I

(3) Producer's business name and address
1) Business name: HUVITZ Co., Ltd.
2) Address: 16-17 (Hogye-dong), 91-beongil, LS-ro, Dongan-gu, Anyang-si, Gyeonggi-do

(4) Weight and packaging unit
1) Packaging unit: 1 unit
2) Weight: 224kg

(5) Purpose of use: Optical microscope for the inspection, observation and filming of the eyeball

(6) Other necessary information
1) Electric rating: 100-240Vac, 50/60Hz, 250-300VA
2) Resistance against electric shock: Class I (earthed)
3) Pollution Degree : II
4) Protection against harmful ingress of water: IPX8 for Foothold maneuvering panel (Foot Switch)
5) Degree of safety in the presence of a flammable anesthetics mixture with air or with oxygen or with nitrous oxide: Not suitable for use in the resence of a flammable anesthetics mixture with air or with oxygen or with nitrous oxide.
6) Mode of Operation: Continuous

※ This product is a medical device.

2. Safety information

2.1. Introduction

Safety is everyone's obligation and responsibility. Safe use of this device concerns
everyone - installer, user, operator and device manager alike. Studying the contents of this user manual personally to learn the contents is required prior to the installation, use, cleansing, repair or adjustment of this device or accessories. It never suffices to emphasize the need to understand the contents of this manual sufficiently in order to ensure the safety of patients or users. The following safety warning signs are include in the appropriate location of this manual in order to ensure that people understand the information related to safety that requires special precaution due to these reasons. All the users and managers need to pay attention and need to understand the "WARNING" or "CAUTION" in the manual.

⚠ WARNING

"Warning" refers to the accident that can lead to severe human injury, death or/and property loss due to negligence.

⚠ CAUTION

"Caution" informs of the accident that can cause minor injury or property loss in case of negligence.

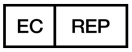
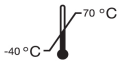
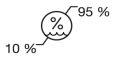
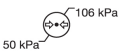
NOTE

"Note" emphasizes essential information. Read this information carefully to prevent device malfunction

2.2. Explanation of the symbols

The following symbols appear in product label.

	ON
	OFF
	Input
	Output
	Caution, Consult accompanying documents.
	Consult instructions for use
	Protective Earth Connection
	Alternating Current
	Direct Current.
	Hot surface.
0197	**European Conformity Notified Body (TUV Rheinland) #: 0197**
	European Conformity

	Dispose of Electrical and Electronic Equipment Correctly
	Date of manufacture
	Manufacturer
	**Authorized Representative in the European Community**
	Serial Number
	**Temperature Limitation**
	**Humidity Limitation**
	**Atmospheric Pressure Limitation**
	This side up
	Fragile , handle with care
	Do not use hand hooks
	Keep DRY
	Stacking Limit by Number

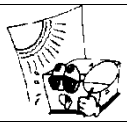
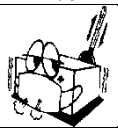
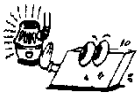
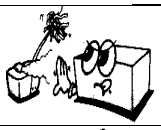
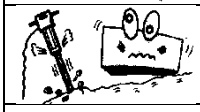
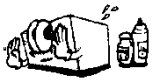
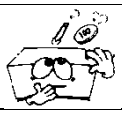
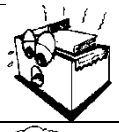
	Keep away from sunlight
	Non-ionizing electromagnetic radiation
	Electrostatic Sensitive
Huvitz	**Huvitz Symol**

3. Caution during use

3.1. Caution prior to use

3.1.1 Environment related matters

Avoid the following environment for effective operation and preservation.

	Place where the device comes directly in contact with moisture (do not operate the device with wet hands)
	Place where device is exposed to the sunlight directly.
	Place where temperature fluctuation is severe (normal temperature for operation ranges from 10°C to 40°C while humidity ranges from 30% to 75%).
	Place near a heating device
	Place with high humidity level and place with problematic protection against heat
	Place where device is exposed to excessive shock or vibration
	Place where there is chemical substance or flammable gas
	Take precaution so that dust or metallic substance does not go into the device.
	Do not disassemble or open up the device. Manufacturer is not responsible for the resulting trouble.
	Do not block the hole for the protection against heat that is located at the top of the device.
	Do not connect the AC power code while the device's parts are not completely connected. This damages the device.

	Do not pull out the power code while holding onto the code.

This device should be used under the following environment conditions:

- **Environment for use**
  - Temperature: 10℃ ~ 40℃
  - Humidity level: 30% ~ 75%
  - Atmospheric pressure: 800 ~ 1060hpa

- **Transport environment**
  - Temperature: -40℃ ~ 70℃
  - Humidity level: 10% ~ 95%
  - Atmospheric pressure: 500 ~ 1060hpa

- **Preservation environment**
  - Temperature: -10℃ ~ 55℃
  - Humidity level: 30% ~ 75%
  - Atmospheric pressure: 700 ~ 1060hpa

Take precaution so that the device is not subjected to excessive shock or vibration.

3.1.2 . Pre-requirements for safety

This device was developed according to the domestic and international safety specs and was verified. This guarantees this device's high safety level. Legally, manufacturer is required to provide sufficient explanation on the device safety related matters to the device user. Use of the manual for this device is compulsory to ensure safety. Thus, please read the manual's instructions sufficiently and understand them before turning on the power. Please inquire with the distributor where you purchased the device for greater information.

1. This device should not be stored and installed at the following locations; (a) place that is vulnerable to explosion or (b) place where there are volatile chemical substances or flammable and explosive substances such as alcohol benzene.

2. Do not store or install at a humid place. To ensure normal operation, humidity level should be from 30 to 75%. Do not expose the device at a place where water splashes significantly, a place where water falls in drops or where water is sprayed. Do not place a container with liquid or gas at the upper part of the device.

3. This device has to be operated by sufficiently trained person or under his or her supervision.

4. This device can be modified only by HUVITZ service technician or others who are qualified.

5. Management of device by user needs to be carried out as explained in the user manual or service manual. Management that goes beyond should be handled by HUVITZ service technician or person with comparable qualification.

6. Manufacturer takes responsibility for this device's safety, reliability and performance when the following conditions are satisfied: (1) when installation takes place in according to this manual's regulation on the viable space (2) when this device was used and maintained and repaired according to the procedure regulated by this manual or service manual.

7. Manufacturer does not take responsibility for the damage resulting from the unlawful modification to this device. Unlawful modification of this device serves as the reason that right may be deprived during warranty period.

8. This device is used along with the components provided by HUVITZ. If consumer wants to use other manufacturer's components, safety of using that component needs to be verified and confirmed by HUVITZ or that component's manufacturer.

9. Only a person who completed adequate training or training program can install, operate, maintain and manage this device.

10. User manual or service manual needs to be kept at a location where the person who manages and use this device can access easily.

11. Do not exert excessive force on the cable connection area. If cable does not get connected easily, then check first whether connector (plug) is suitable for the socket. When connector or socket is damaged, have a qualified service technician repair it.

12. Do not pull on the device's cable. When opening up the cable, pull out by holding on the plug.

13. Before using the device, check the device's external appearance at all times, and check whether this device works effectively.

14. Do not block device's hole for the protection against heat.

15. Turn off the power immediately and take out the plug when smoke, spark, abnormal noise or smell is evident in the device.

16. It is necessary for an outside device to satisfy IEC standard if it is to be connected to the input/output signal or other connector. (IT equipment needs to satisfy IEC 60950, while electric equipment for medical use needs to satisfy IEC 60601) Moreover, all the systems need to satisfy safety requirement, IEC 60601-1-1 for electric equipment for medical use. Person who connects outside device with input/output signal or otherconnector needs to take responsibility in accordance to the IEC60601-1-1. If doubtful, contact the local technician or distributor.

17. To avoid danger of electrocution, connect the Protective Earth Connection together when connecting this device to the power.

18. When installing/using equipment, use after placing it at a place where power code can be inserted/separated easily.

3.2. Caution during use

- Handle with caution since inside and outside damage may be caused due to shock.
- This device was made to use at office, hospital or medical institution.
- Only a doctor, nurse or user manual who read this manual and medical professional who underwent adequate education has to operate this device.
- Installation conditions should be suitable for precision surgery. For example, it should be operated at a place with low vibration and at clean environment.
- When using by connecting with other equipment, the get guidance at the place of purchase.
- When the interior of a cold area is heated up all of the sudden, then vapor may be generated at the optical zone item that is located at the object lens towards the customer and at the inside of the device. In this case, use after waiting until vapor disappears.
- Pull out of the power plug when smoke, smell or noise results during use in order to separate the power. Then, get the guidance of the place of purchase.
- Do not use organic solvents such as alcohol, thinner, benzene and others since their use may damage the equipment when this equipment's surface is cleaned with them.
- When moving HOM-700, turn off the power switch always, and move according to the transport method attached to the stand.
- When HOM-700 is not used for a long time, then separate the power and cover with the dust cover first.

3.3 Caution after use

⚠ WARNING

Clean immediately after using the equipment and optional item.
Cleaning and sterilization become difficult when contaminated substance gets adhered to this equipment.

⚠ CAUTION

Damage to the tilting rotating control panel
- Use only the fingers to operate the control panel. Do not use hard, pointy and sharp object.
- Do not clean the control panel with the cleansing substance that includes abrasive substance.
- Turn off the power before cleaning the control panel and separate the power line.
- Clean the control panel with soft lint-free cloth.

Preservation after use

- Turn off the power with the power switch of the set location, and take out the power code.
- Do not pull out the power code while holding the code or do not exert excessive force.
- When not used for a long time, separate the power from the power outlet and keep.
- Clean the components, code and others, and organize them.
- Maintain the device clean so that there won't be a problem when using the next time.
- Do not disassemble or open up the device. Manufacturer is not responsible for ensuing problem.
- Do not connect the power code while the device's parts are not connected completely. This may damage the device.
- When device is not used for a long time, separate the power and cover the dust cover first.

4. Key attributes

- This is multi-dimensional microscope designed to change the visual field to be viewed through scale factor conversion at the ophthalmology during surgery process.

- As for the observation part, angle gets converted to 0° ~30° angle through 10X, Eyepiece with scope of visual field of 21mm, and it is comprised of the tilting binocular observation part that can adjust the distance between pupils up to 55~75mm.

- As for the Observation scale factor conversion, it takes place with deceleration continuous electric zoom with zoom ratio of 6:1.

Electric zoom optical scale factor (object lens focal distance 225mm)	Total optical scale factor (when using ocular 10x, FN21mm)	Scope of visual field (mm)
0.31x	3.1x	68mm
0.485x	4.85x	43.5mm
0.759x	7.59x	27.7mm
1.1885x	11.885x	17.7mm
1.86x	18.6x	11.2mm

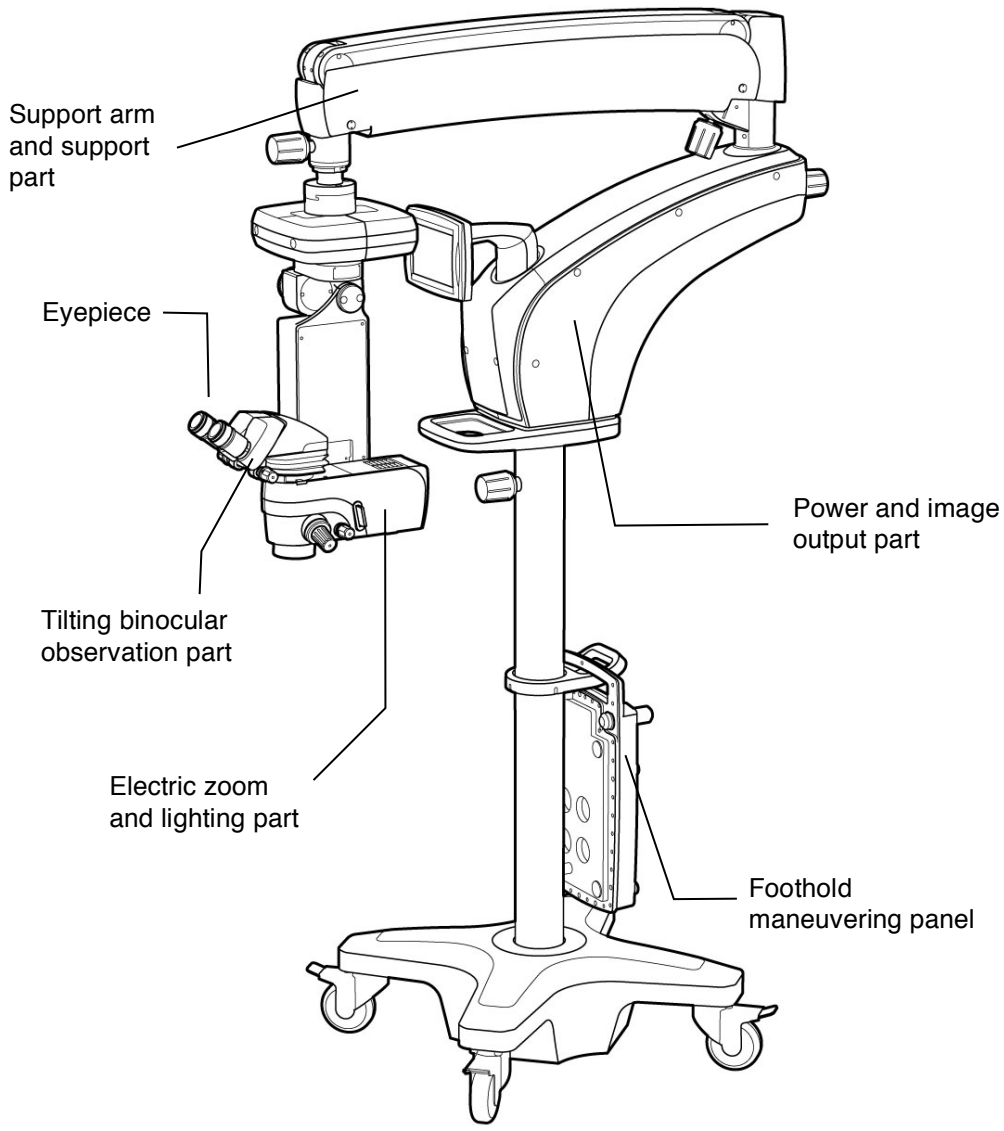
- Lighting part's diameter is 70mm. It is comprised of the 0 degree lighting that makes the Red reflex appear and of the 6 degree lighting that can be adjusted with aperture shutter when it comes to the brightness of the light quantity at the surrounding. Two 12V, 50W halogen lamps are built-in. Spare lighting is included for emergencies. Moreover, IR, UV protection filter is built-in. Moreover, two slots that can use option filter with 32mm diameter are built-in.

- XYZ axes conveying unit is 50x50x50mm, enabling deceleration control with 50x50x50mm. When activating power on or foothold control panel, this includes the automatic location for initial value re-setting and optical zone tilting part (minute adjustment of the angle knob within ±5°).

- Stand is comprised of the arm that supports optical zone, base is insensitive to the vibration and foothold that controls optical zone.

5. Product description

5.1. Key part



[Diagram 1. Key part]

6. Operation procedure

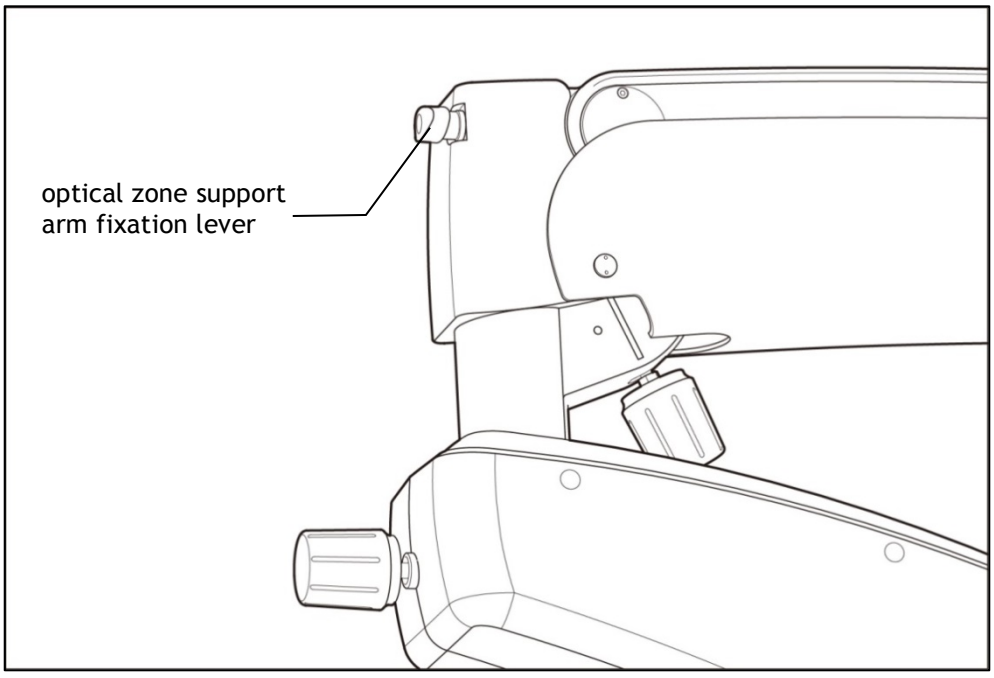
6.1. Ophthalmic optical microscope installation

⚠ WARNING

Risk of injury following ophthalmic optical microscope's downward movement
- Do not exceed 17.8 Kg when it comes to the maximum weight of the microscope that includes optical optional item.
- Balance out the optical zone support arm at all times after optical optional item installation.

6.1.1. Optical zone support arm fixation

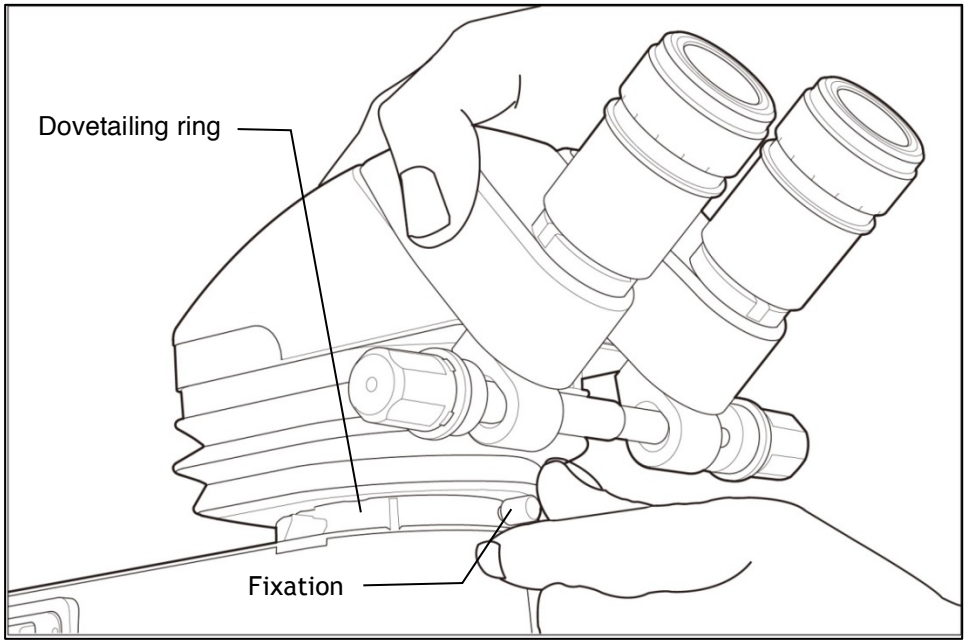
- Place the support arm horizontally.
- Push in the optical zone support arm fixation lever shown on Diagram 2, turning it horizontally, and move the support arm up and down when the fixation lever makes the click sound.



[Diagram 2. optical zone support arm fixation]

6.1.2. Tilting binocular observation part installation

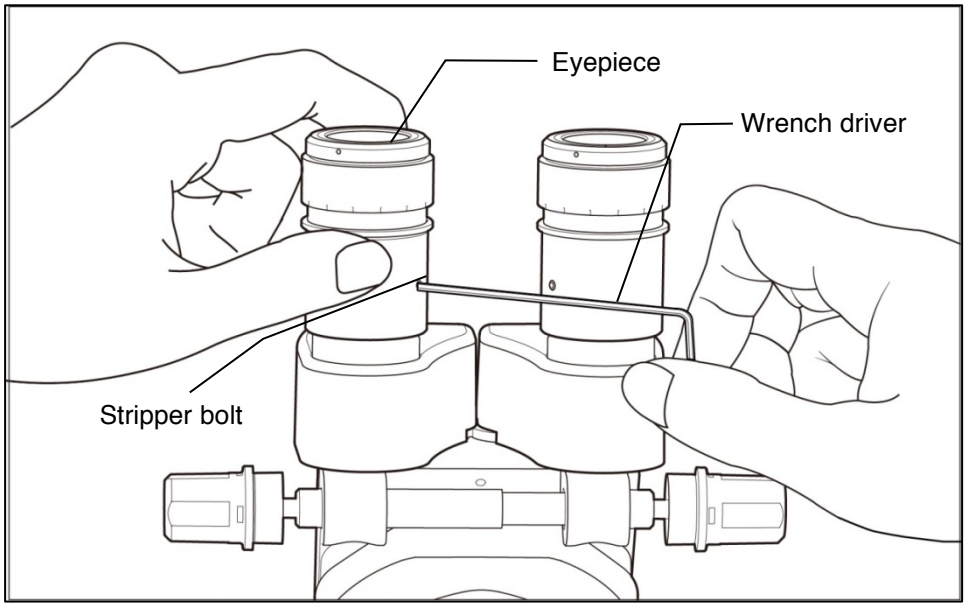
- Unscrew the screw for fixating shown on Diagram 3.
- Push in the tilting binocular observation part into the inside of the Dovetailing ring.
- Tighten the fixation screw.



[Diagram 3. tilting binocular observation part installation]

6.1.3. Eyepiece installation

- Assemble the eyepiece as shown on Diagram 4.
- Fixate the stripper bolt by using wrench driver.



[Diagram 4. Eyepiece installation]

6.1.4. Eyepiece Parfocality adjustment

Adjust each of the left/right eye accurately by adjusting Diopter value. Adjust the Eyepiece's Diopter value so that the same focus can be maintained during scale factor modification with the scale factor.

1. Preparing the microscope
   - Turn on the power. Place flat sample specimen that is like the paper, below the object lens.
   - Adjust control panel or foothold panel to fit to the maximum brightness.
   - Adjust control panel or foothold panel to fit to minimum scale factor.
   - Align the height by adjusting the handle of the optical zone so that the center of the scope of visual field can be most visible.

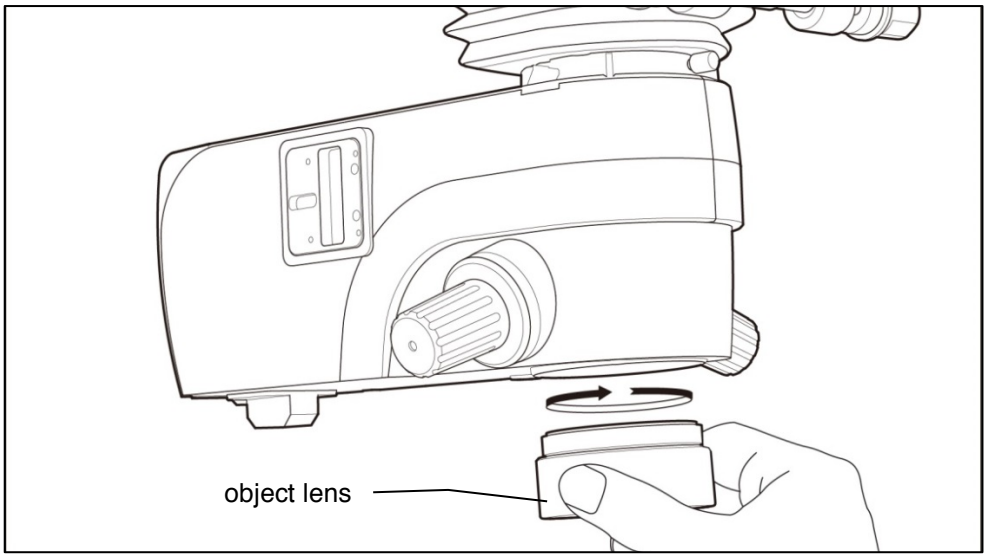
2. Focusing sample specimen
   - Adjust control panel or foothold panel and fit to the maximum scale factor.
   - Adjust the location of the focus for the microscope of the control panel so that the center of the scope of visual field can be most visible.
   - Adjust control panel or foothold panel to fit to the minimum scale factor.

3. Fitting Eyepiece's Diopter
   - Turn the Eyepiece's Diopter rotating ring to fit it so that the location of the focus is most visible.
   - Adjust control panel or foothold panel to fit to maximum scale factor.
   - Re-adjust the location of the focus of the microscope of the control panel so that the center of the scope of visual field is most visible.
   - Adjust control panel or foothold panel to fit to minimum scale factor.

4. Parfocality confirmation
   - Observe sample specimen through total scale factor, and check whether set focus is maintained.
   - If focus is not maintained, repeat the processes of the above mentioned B) to D) to focus the Eyepiece's Diopter.

6.1.5. Object lens installation

- Close the object lens by turning it to the right as shown on Diagram 5.



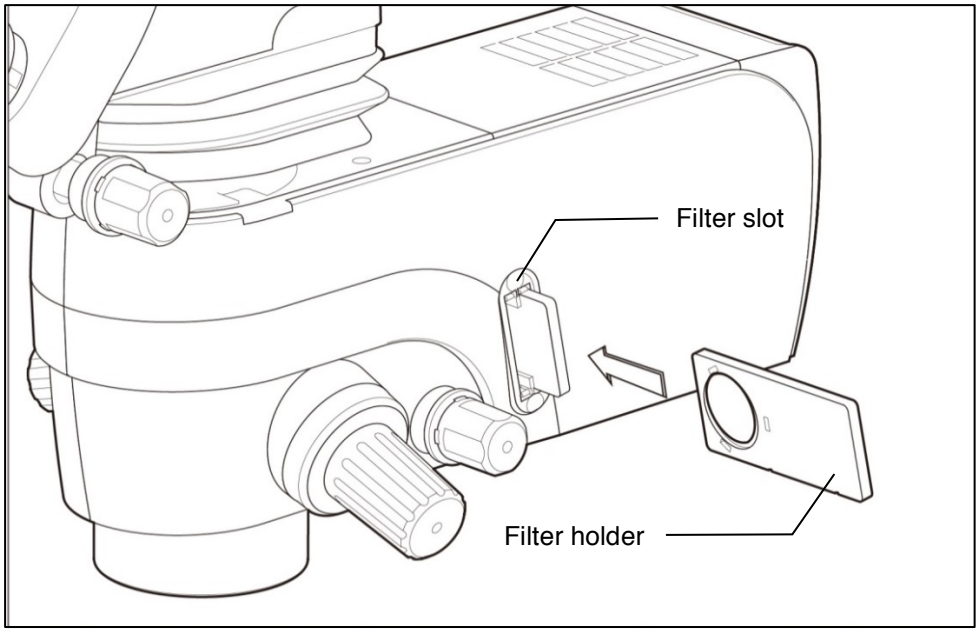
[Diagram 5. object lens installation]

⚠ WARNING

- Tighten the fixation screw since there is a risk of injury resulting from tilting binocular observation part, Eyepiece, and falling off object lens during installation.
- Before using, check always whether tilting binocular observation part, object lens' fixation screw and object lens are fixated safely.

6.1.6. Option filter installation

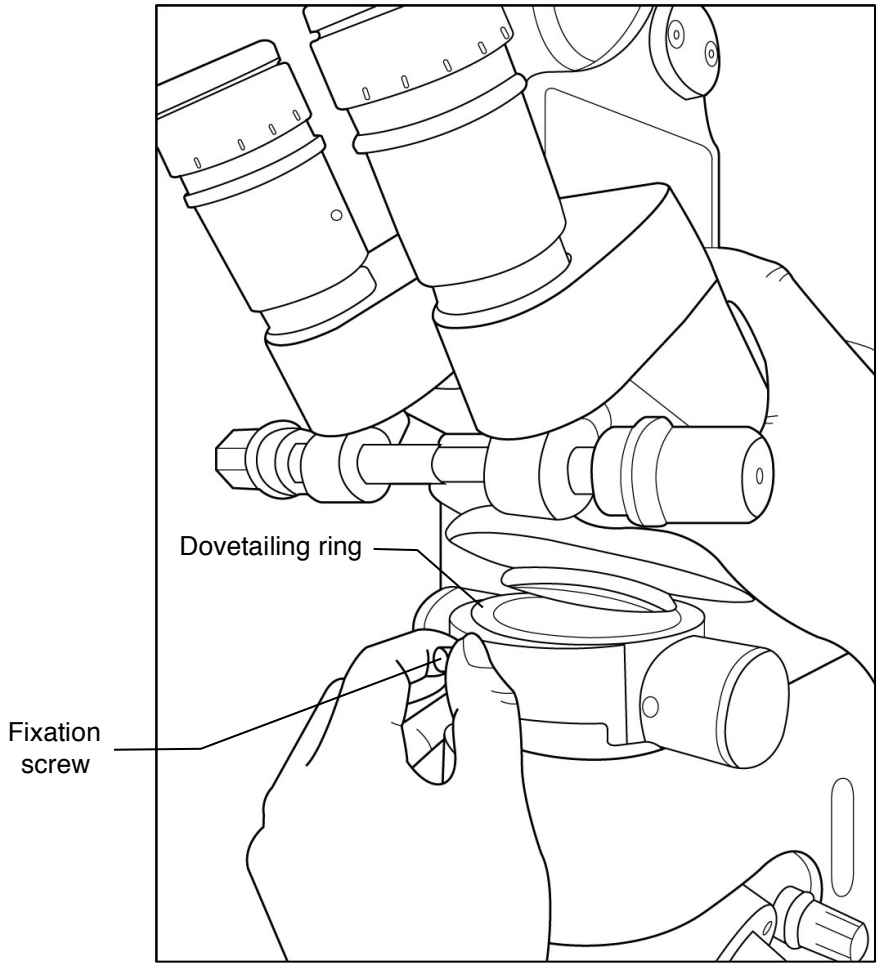
HUVITZ HOM-700 provides slot for using option filter.
- Take out the filter mount from the filter slot shown on Diagram 6.
- Insert option filter into the filter holder.
- Inset filter holder into the filter slot.



[Diagram 6. Option filter installation]

6.1.7. Option beam splitter part installation

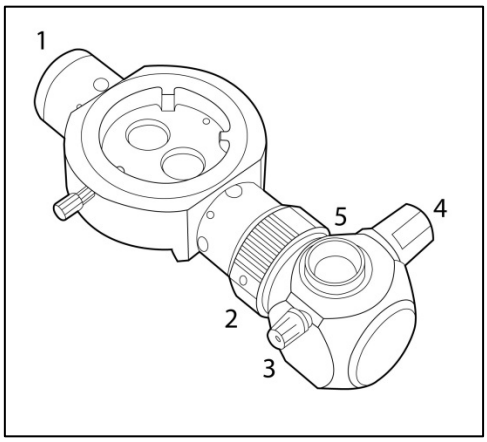
- Unscrew the screw used for fixation as shown on Diagram 7.
- Push in the option beam splitter part into the zoom Dovetailing ring.
- Push in the tilting binocular observation part into the option beam splitter part's Dovetailing ring.
- Tighten the fixation screw.



[Diagram 7. Option beam splitter part installation]

6.1.8. Option camera port part installation

- Option camera port part that provides C-mount camera port at the outside

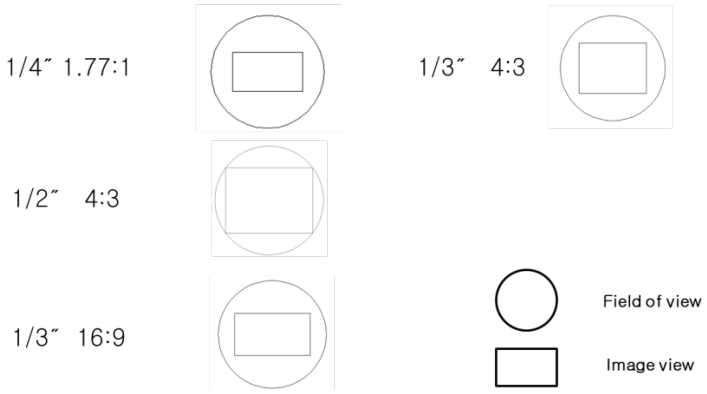


[Diagram 8. Option camera port part installation]

1. Option beam splitter connection part
2. Fixation ring
3. C mount adapter's fixation bolt
4. Focus adjustment knob
5. C mount adapter

- Scope of visual field VS camera image share following camera specs

Camera focal length = 58mm ($F_{\text{Tube lens focal length}}$ = 160mm)
Chip size of camera

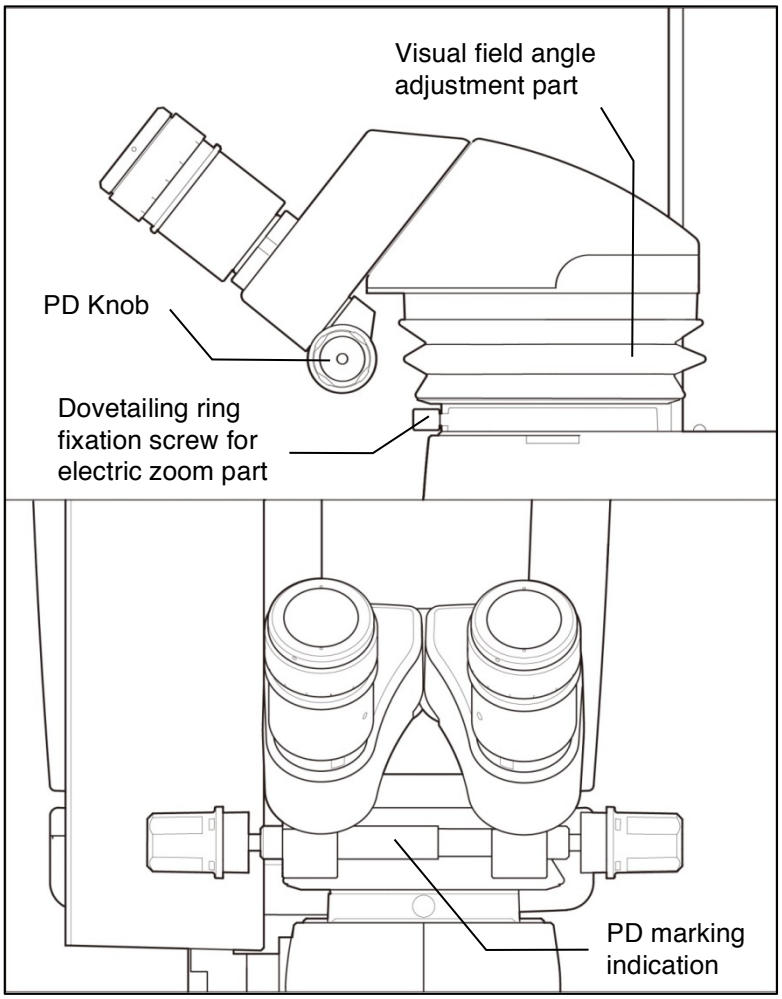


NOTE
When connecting the C mount camera at the outside, noise may appear on the screen due to the cable's length and type, and quality of the

monitor at the outside.

6.1.9. Adjustment of the distance between the two eyes and view angle

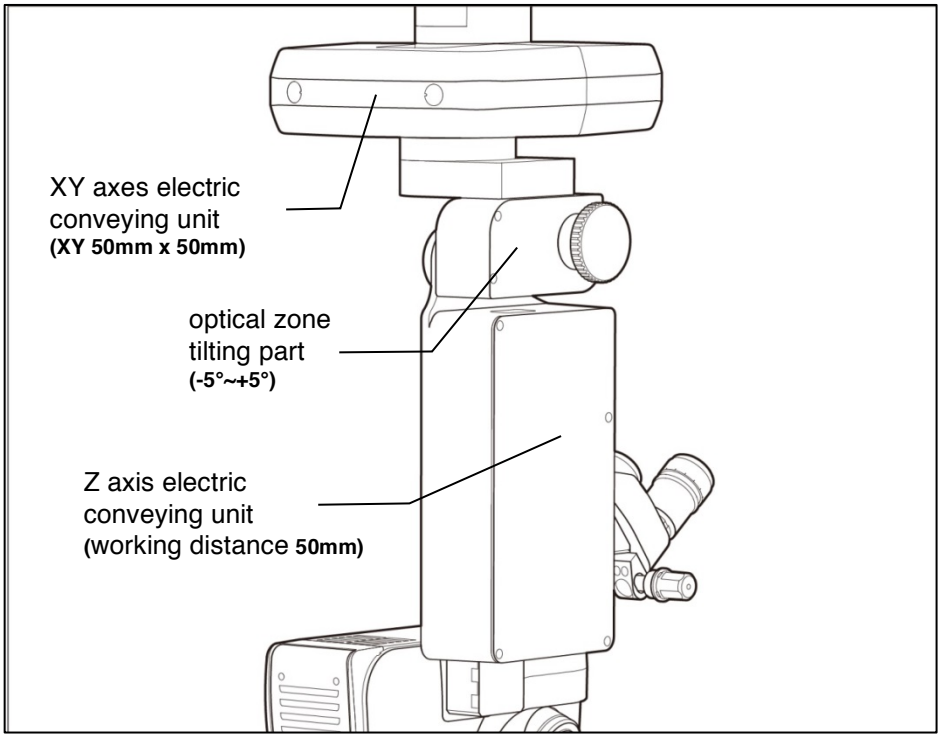
- As for the adjustment of the distance between the two eyes, turn the PD knob of the Diagram 7 so that the distance can be adjusted up to 55~75mm of the marking when it comes to PD marking indication to suit the user. It is possible to adjust the angle up to 0°~30° to suit the user through visual field angle adjustment part.



[Diagram 9. Adjustment of the distance between the two eyes and view angle]

6.1.10. Optical zone tilting part angle adjustment

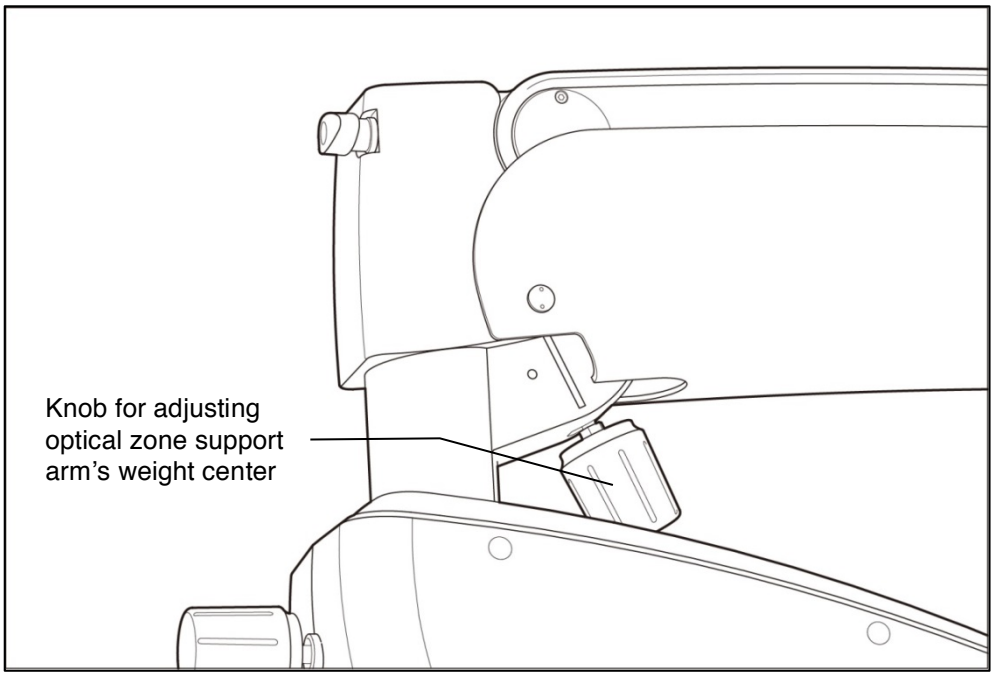
- It is possible to adjust the angle of -5°~+5° by turning the knob of the optical zone tilting part to suit user's height when seated.



[Diagram 10. XYZ axes electric conveying unit]

6.1.11. Adjustment of optical zone support arm's weight center

- When the above mentioned matters are assembled, turn the knob for adjusting the optical zone support arm's weight center shown on Diagram 9. When optical zone moves up and down, then turn the knob up to the point where the up and down conveying change is lowest.

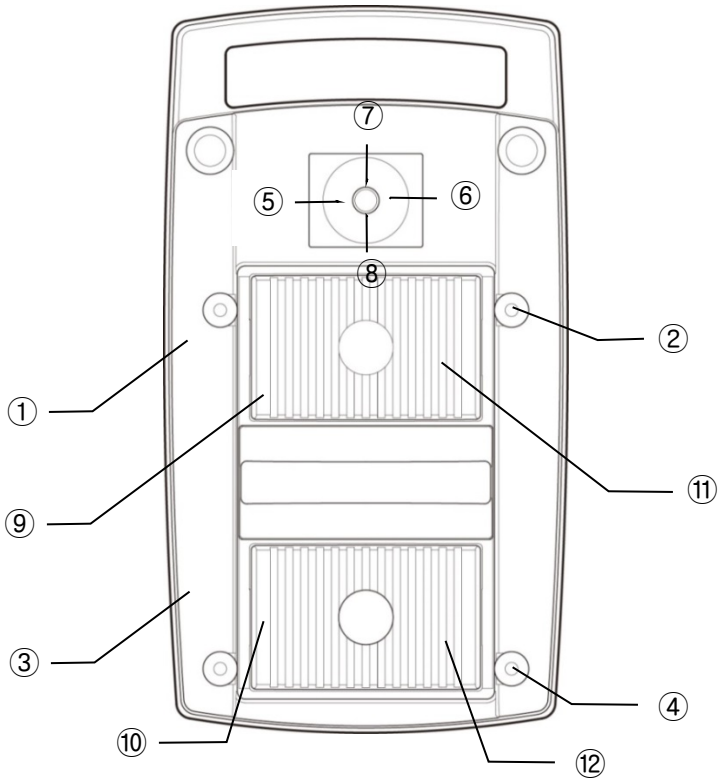


[Diagram 11. Adjustment of optical zone support arm's weight center]

6.1.12. Foothold panel maneuvering mode modification

6.1.12.1 Foothold panel maneuvering button setting

- The initial setting value is shown on Diagram 10. It is possible to modify the setting value using the method that user desires through the control panel's Foot switch button.

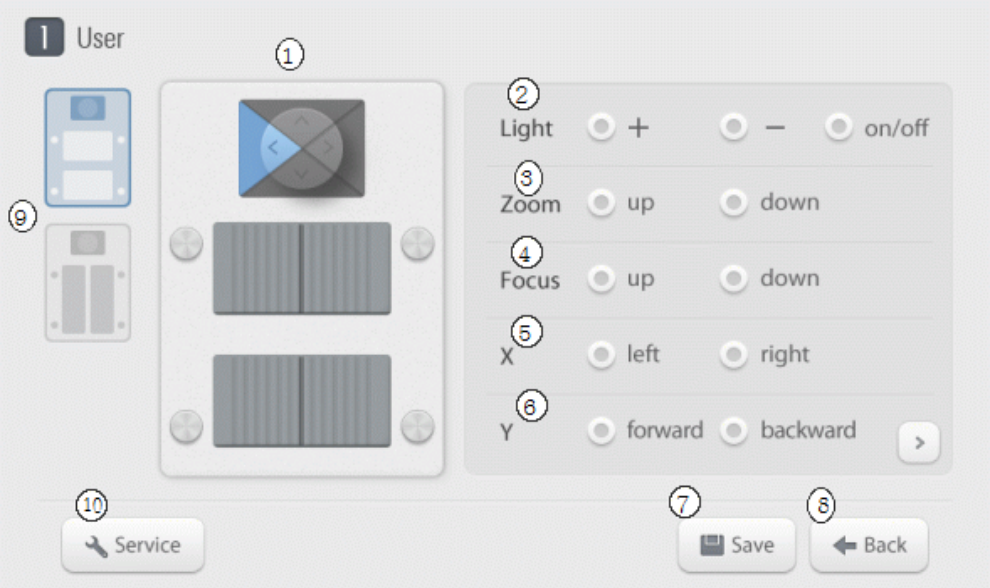


[Diagram 12. Foothold panel maneuvering button setting]

1. Light + : Button to increase lighting source's brightness
2. Light - : Button to decrease lighting source's brightness
3. Light on/off : lighting source operation or stop button
4. XY Reset : location of XYZ transfer part's starting point
5. X left : X axis right side transfer button
6. X right : X axis right side transfer button
7. Y forward : transfer button to the front of the Y axis
8. Y backward : transfer button to the back of the Y axis
9. Zoom +: high magnification conversion button
10. Zoom - : low magnification conversion button
11. Focus up : upper side transfer button for focus location
12. Focus down : lower side transfer button for focus location

6.1.12.2. Foothold panel maneuvering setting screen

- It is possible to set up as explained below when re-setting foothold panel maneuvering button to suit the user.



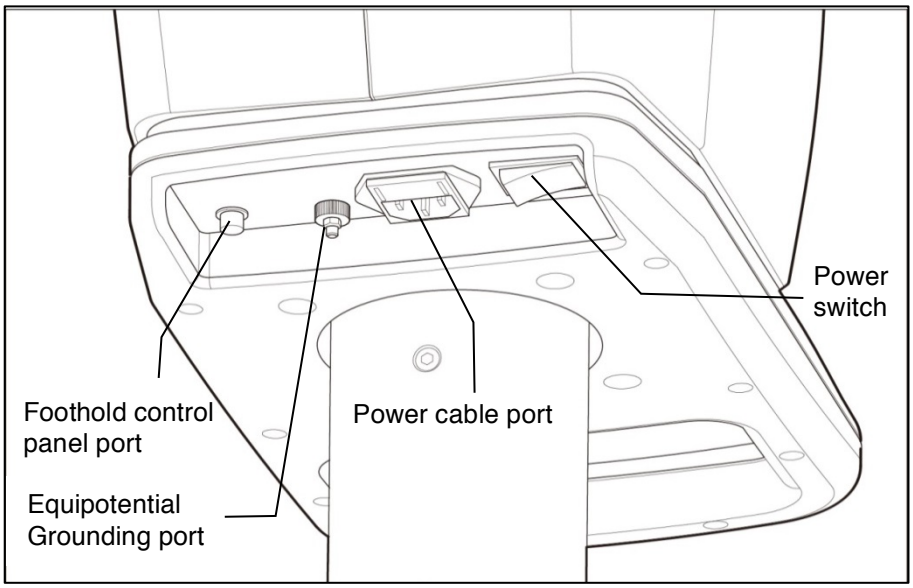
[Diagram 13. Foothold panel maneuvering setting screen]

---

1. **Light : lighting source maneuvering button setting (+ : increase brightness, - : decrease brightness, on/off : lighting activation/stop)**
2. **Zoom : indication of electric zoom's optical magnification (7~42x)**
3. **Zoom : magnification conversion maneuvering button setting (up : increase magnification, down : decrease magnification)**
4. **Focus : focus conversion maneuvering button setting (up : increase focus, down : decrease focus)**
5. **X : X axis transfer part maneuvering button setting (left : X axis left side transfer, right : right side transfer)**
6. **Y : Y axis transfer part maneuvering button setting (forward : transfer to the front of the Y axis, backward : transfer to the back of the Y axis)**
7. **Save : saving maneuvering button setting value**
8. **Back : enter into main mode**
9. **Footswitch mode : setting up the foothold panel method**
10. **Service: enter into service mode**

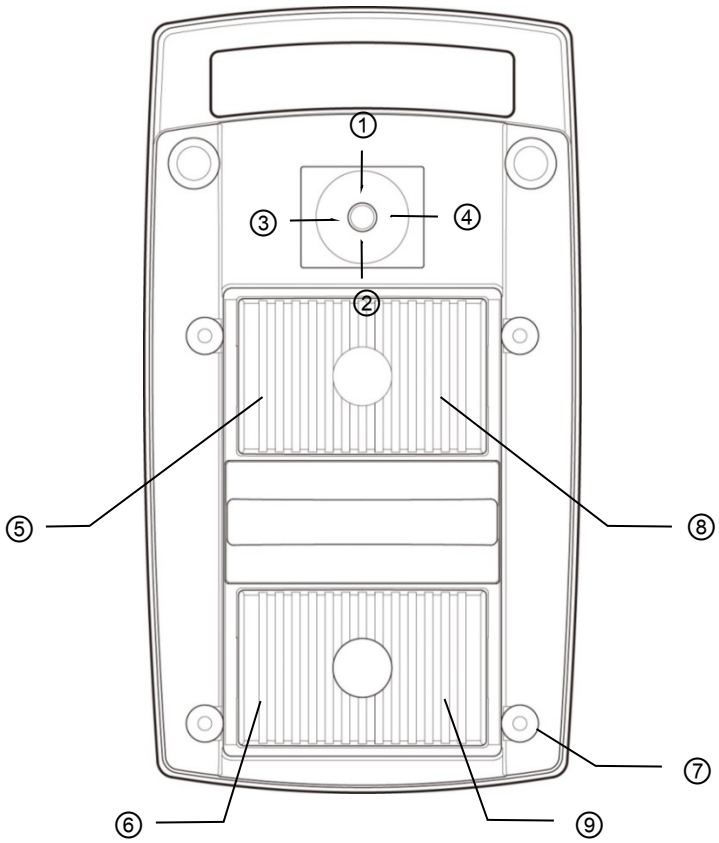
6.1.13. Power connection

- Connect the foothold control panel's cable to the foothold control panel port.
- When using optional accessory, ground the Equipotential Grounding port with the equipment to be used.
- Connect power cable to the power cable port.
- When using the built-in optional camera port, connect the HDMI cable to the HDMI port.
- When all the above mentioned matters are completed, use by turning on the power switch before using.



[Diagram 14. Connecting power]

6.2. Optical zone maneuvering

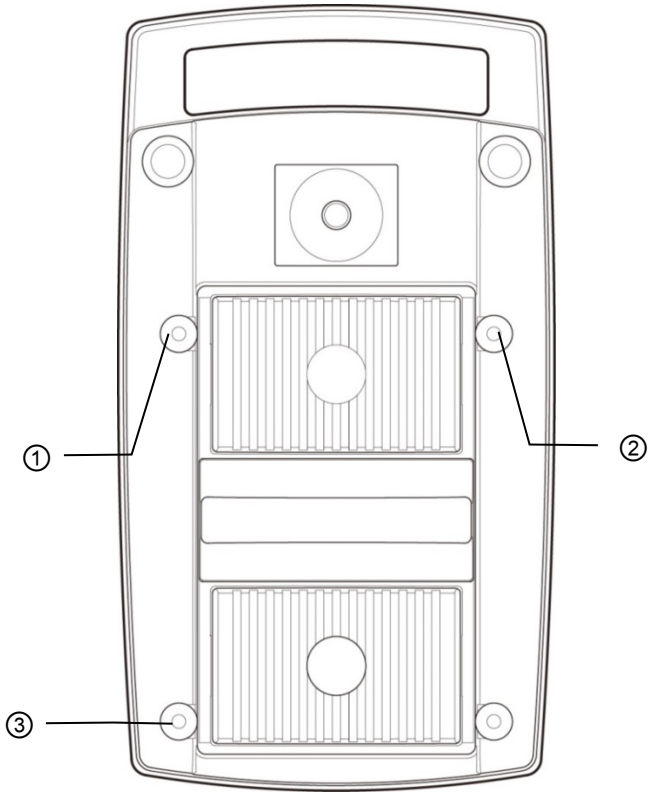


[Diagram 15. Maneuvering optical zone]

1. Y forward : button to transfer to the front of the Y axis
2. Y backward : button to transfer to the back of the Y axis
3. X left : X axis left side transfer button
4. X right : X axis right side transfer button
5. Focus up : focus location upper side transfer button
6. Focus down : focus location lower side transfer button
7. XYZ Reset : button to reset the XYZ transfer part to the starting point
8. Zoom + : high magnification conversion button
9. Zoom - : low magnification conversion button
(Method for modifying foothold control panel value is shown on 1-A-8) at the initial setting value.)

6.3. Maneuvering lighting part

- Lighting part's light quantity is maneuvered as follows.



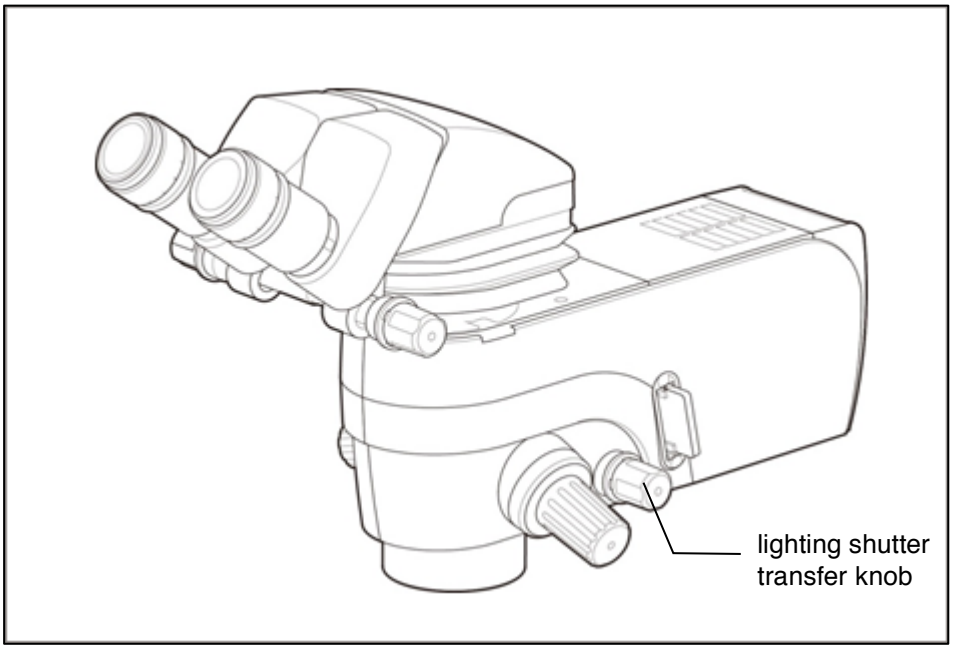
[Diagram 16.Maneuvering optical zone]

---

1. Light + : Button for increasing lighting source's brightness
2. Light - : Button for decreasing lighting source's brightness
3. Light on/off : Button for activating or stopping lighting source
(Method for modifying foothold control panel value is shown on 1-A-8) at the initial setting value.)

6.4. Lighting part shutter transfer

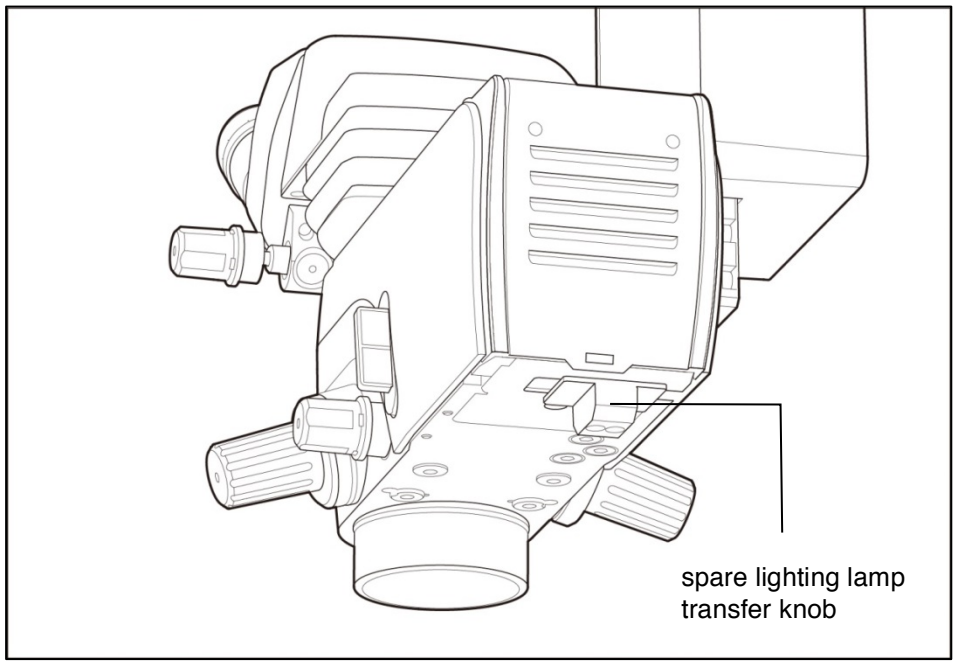
- Use of lighting part's lighting shutter is shown on Diagram 15.
- When using merely 0 degree lighting: turn the lighting shutter towards the counter clock-wise direction.
- When both 0 degree + 6 degree lightings are used: turn the lighting shutter towards the clock-wise direction.



[Diagram 17.Lighting part shutter transfer]

6.5. Use of spare lighting lamp

- When lighting lamp is turned off while using it, move the spare lighting lamp transfer knob, shown on Diagram 16, to the left and right, and use by transferring spare lamp.

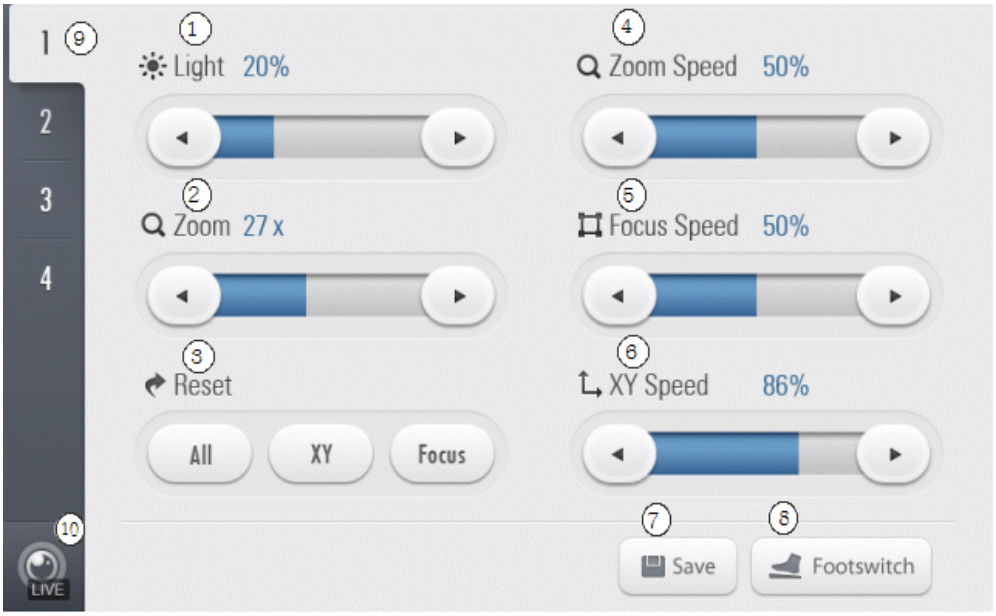


[Diagram 18.Use of lighting part's spare lamp]

6.6. Tilting rotation controlling monitor

6.6.1. Key screen

When HUVITZ HOM-700's power switch is turned on, Main menu appears on the control panel screen. It is possible to control with the next setting.



[Diagram 19. Key screen]

1. Light : indication of lighting source's brightness value (0~100%)
2. Zoom : indication of electric zoom's optical magnification (3.1~18.7x)
3. Reset : button to reset initial value of the XY axis transfer part and Z axis focus part, each or XYZ axis transfer part total
4. Zoom speed : electric zoom's transfer speed indication (0~100%)
5. Focus Speed : Z axis focus part의 transfer speed indication (0~100%)
6. XY Speed : XY axis transfer part의 transfer speed indication (0~100%)
7. Save : User setting saving button
8. Footswitch : Footswitch setting mode screen conversion button
9. User setting (1~4) : basic setting value for up to 4 users

6.6.2. Foothold setting screen

- Footswitch keypad: foothold panel part setting

[Diagram 20. Foothold setting screen]

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1. **Foothold location indication**
2. **Light : lighting source maneuvering button setting (+ : increase brightness, - : decrease brightness, on/off : lighting activation/stop)**
3. **Zoom : magnification conversion maneuvering button setting (up : increase magnification, down : decrease magnification)**
4. **Focus : focus conversion maneuvering button setting (up : increase focus, down : decrease focus)**
5. **X : X axis transfer part maneuvering button setting (left : transfer X axis to left side, right : transfer to right side)**
6. **Y : Y axis transfer part maneuvering button setting (forward : transfer Y axis forward, backward : transfer Y axis backward)**
7. **Save : saving maneuvering button's setting value**
8. **Back : enter into main mode**
9. **Footswitch mode : setting up foothold panel method**
10. **Service : enter into Service mode**

7. Maintenance and repair

7.1. Error message and trouble-shooting

7.1.1. Optical zone trouble-shooting

Type of problem	Root causes	Solution measures	Reference
Does not work at all	power cable deviation	check power cable connection	6.1.9 power connection
	power switch does not get turned on	check power switch	
Lighting form is strange	Lamp was not assembled at the correct location	Adhere lamp to the left/right side as much as possible	6.5 use of spare lighting lamp
Lamp trouble indicator is lit	One of the two lamps malfunction	Transfer to and use the spare lamp on the opposite side	7.1. error message and trouble-shooting
	Two lamps malfunction	replace all with spare lamps	7.3.1 lamp replacement method
XYZ axes driving part operation	When XYZ axes do not get activated or stuck at the foremost upper and lower parts	Press on the control panel's re-set button	5.2.1 screen indication(1)-Main mode
		inquire manufacturer	11. service information
Zoom driving part operation	Zoom does not operate or stuck at the foremost upper and lower parts	Press on control panel's reset button	5.2.1 screen indication(1)-Main mode
		inquire manufacturer	11. service information
XYZ/Zoom driving part malfunctions	total system malfunction resulted	inquire manufacturer	11. service information
Image quality decreases	Eyepiece was not assembled accurately	Check Eyepiece's assembly state	6.1.3 Eyepiece installation
	Eyepiece Diopter was not fit accurately	Re-set Eyepiece Diopter according to manual's instructions	6.1.4 Eyepiece Parfocality adjustment

Strange miscellaneous lights are shown	object lens was not assembled accurately	Assemble by turning the object lens as much as possible	6.1.5 object lens installation
The image at the center is cut off	filter holder apparatus part does not get inserted accurately	Attach filter holder apparatus part accurately in the holder	6.1.6 option filter installation
XY transfer direction is inappropriate	XY direction setting is wrong	Press total re-set button at the control panel	5.2.1 screen indication(1)-Main mode
		Check foothold setting mode	6.1.8.1 foothold panel maneuvering button setting

7.1.2. Stand trouble-shooting

Type of problem	Root causes	Solution measures	Reference
Optical zone support arm moves up and down on its own	optical zone support arm's balance is not adequate	balance optical zone support arm.	7.6.2 optical zone support arm fixation
optical zone support arm comes down at the balanced marker's foremost upper stage	Accessories' total weight is too high	Decrease accessories' weight.	6.1.8 adjust optical zone support arm's weight center
Optical zone does not move even when considerable physical power is exerted	force of optical zone support arm's brake is too strong	check brake	5.1.5 stand
Function through foothold does not operate	foothold connector is loose	check power cable	6.1.10 power part
		check foothold connector	
		check foothold setting mode	6.1.9.2 foothold setting screen

7.2. Cleaning

• Optical zone's cleaning management method
- Avoid using cleaning material that includes abrasive.
- Clean optical zone such as object lens and Eyepiece with minute superfine fiber cloth for optical cleaning wet with distilled water or alcohol.

• Apparatus part cleaning management method
- Avoid use of the cleaning item that includes abrasive.
- All the apparatus parts of the ophthalmic optical microscope should be cleaned with air pressure pump, soft brush or cloth wet with distilled water or alcohol.

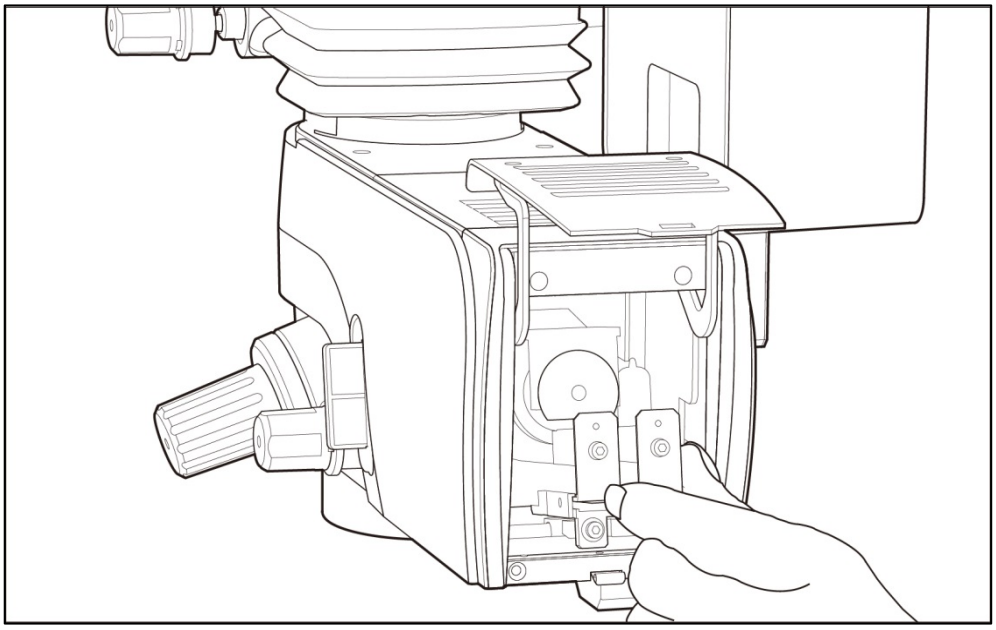
• C. Sterilization management method
- Use Autoclave to use the below mentioned parts after sterilizing within 134°C and 10 minutes.

A) Optical zone handle cover
B) PD adjustment part handle cover
C) Lighting shutter handle cover

7.3. Replacement

7.3.1. Lamp replacement method

- Open the lamp cover.
- Take out the halogen lamp from base holder.
- Push in the new halogen lamp deep into the base holder to the end.
- Close the lamp cover.



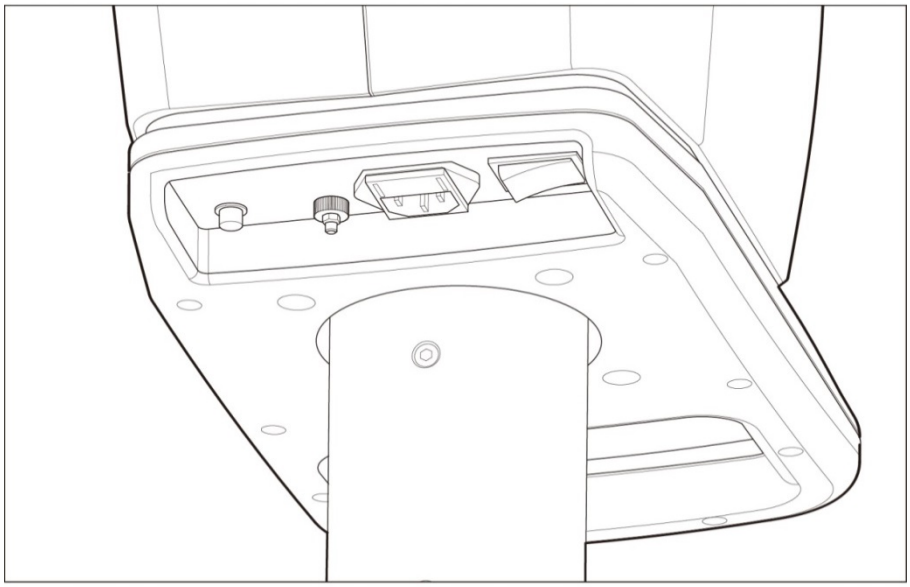
[Diagram 21. Lamp replacement]

⚠ CAUTION

Risk of burn
- Be careful of the burn since lamp and lamp apparatus part are hot immediately after use.
- Cool down sufficiently before replacing the lamp, then replace the lamp afterwards.
- Replace the lamp that broke down during use, immediately after use.
- Use only the lamp that is provided by the manufacturer.

7.3.2. Power fuse replacement method

- Power fuse is located at the inside of the fuse holder at the inside of the power socket of the equipment.
- Use the screw driver to take out the fuse after opening the fuse holder.
- Check whether fuse is disconnected.
- When fuse is disconnected, replace with new fuse.



[Diagram 22. Power fuse replacement]

⚠ WARNING

There is a risk of death from electrocution.
- Separate the power cable before replacing the fuse.
- Use only the fuse provided by the manufacturer.

7.4. Replacement item list

- Lamp: 12V/50W halogen lamp (inquire the manufacturer when replacing.)
- Power fuse: 2 X T 6.3 A

7.5. When moving the location for equipment installation

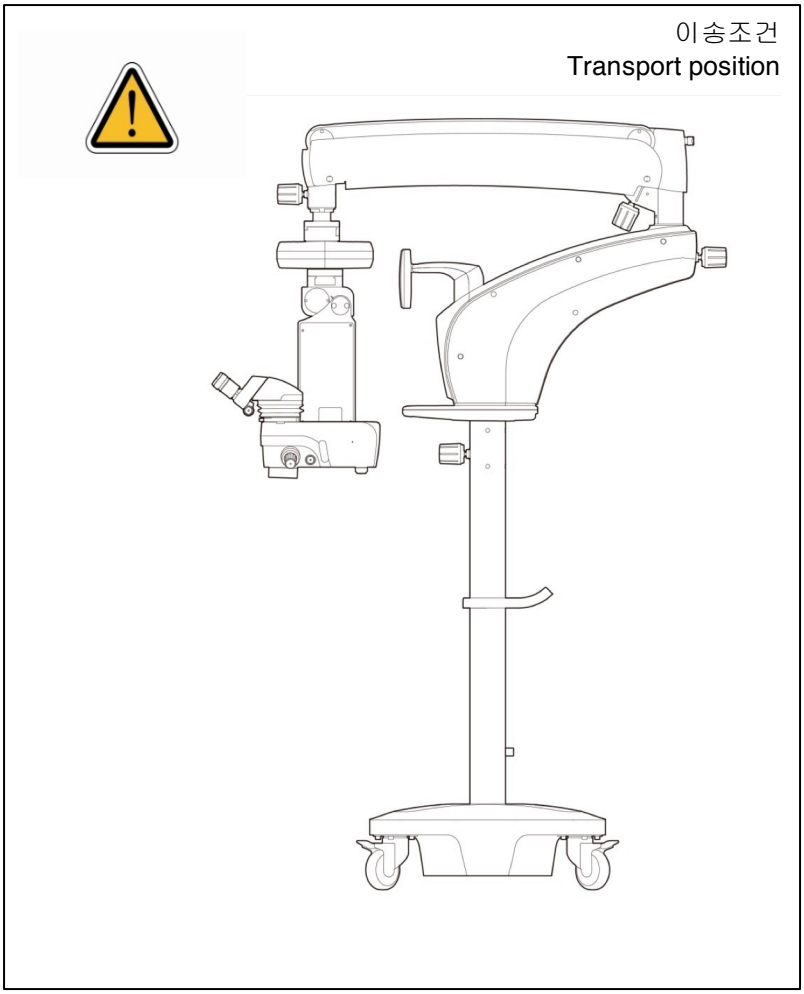
⚠ CAUTION

- Optical zone support arm may cause injury since it can move randomly to undesired direction.
- Comply with the moving method always when moving the ophthalmic optical microscope.
- Be careful since the toes may get stuck at the support part's caster wheel while moving.
- Always have the brake of the caster wheel on when not moving.

7.5.1. Moving method

- Optical zone support arm fixation is as explained below.
- Prepare the equipment as shown on the following diagram and move.

이송조건
Transport position



8. Key specs

8.1. Optical zone

1) Eyepiece
   A) 10x scale factor, 21mm scope of visual field (option, 8.33x scale factor, 22mm scope of visual field)
   B) Diopter adjustment scope of -8D~+5D

2) Tilting binocular observation part
   A) Attention slope angle 0° ~30°
   B) Distance between pupils 55~75mm.

3) Electric zoom and lighting part
   A) Deceleration electric Zoom of the continuous scale factor conversion concerning zoom ratio 6:1 (0.31x~1.86x)
   B) 3.1x ~ 18.6x continuous scale factor conversion when using 200mm working distance object lens and 10x Eyepiece
   C) 0 degree lighting of even 70mm diameter
   D) Brightness adjustment is enabled, 6 degree lighting On/Off shutter
   E) Two 12V, 50W halogen lamp built-in that enable rapid transfer
   F) IR protection filter built-in
   G) UV protection filter built-in
   H) Two slot built-in that can use option filter of 32mm diameter

Electric zoom optical scale factor (object lens focal distance 225mm)	Total optical scale factor (when using ocular 10x, FN21mm)	Scope of visual field (mm)
0.31x	3.1x	68mm
0.485x	4.85x	43.5mm
0.759x	7.59x	27.7mm
1.1885x	11.885x	17.7mm
1.86x	18.6x	11.2mm

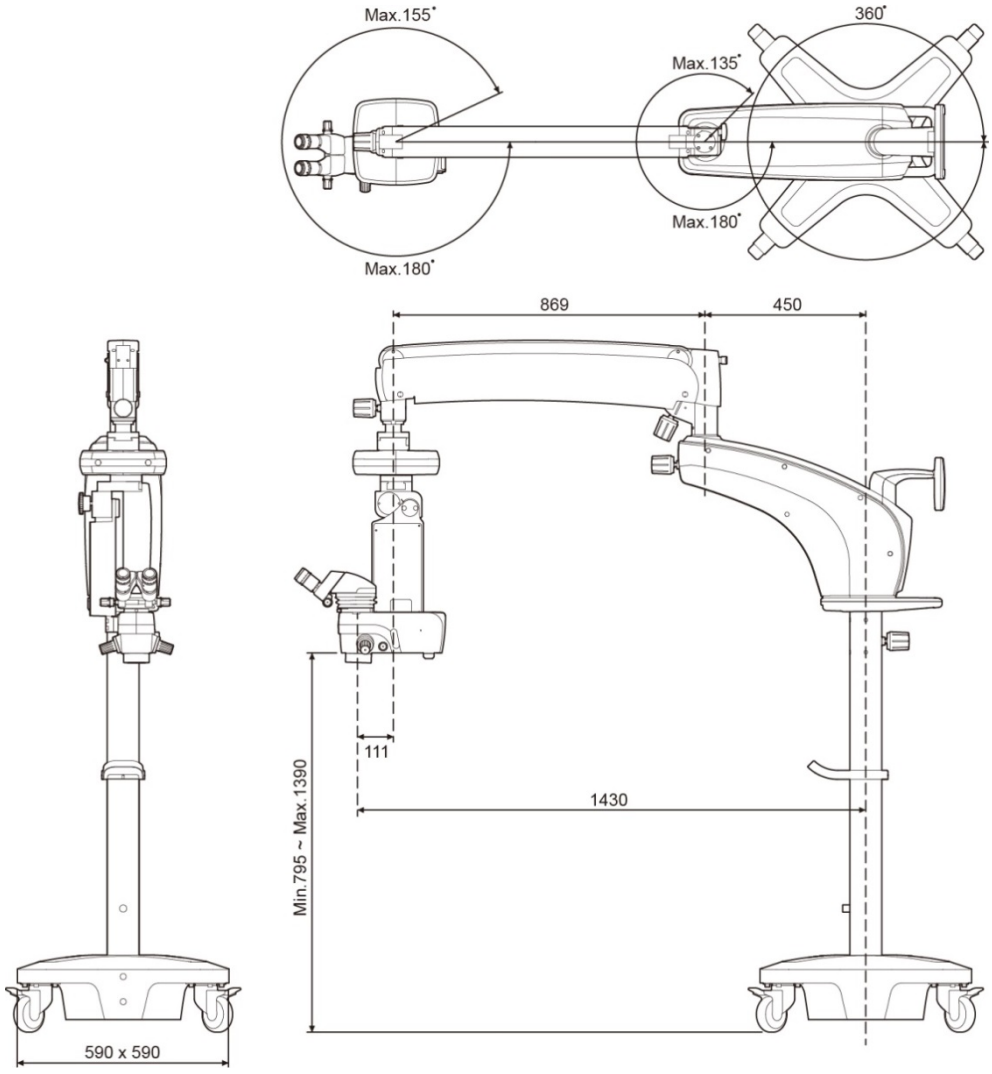
4) XYZ axes conveying unit
   A) Transfer distance of XYZ axes 50mm x 50mm x 50mm
   B) Deceleration control is enabled
   C) Reset initial value's automatic location when activating power on or foothold control panel
   D) Optical zone tilting part (adjust angle within ±5° when it comes to manual knob minute)

5) Optional camera port part
   A) Beam splitter penetration ratio observation 80%, camera 20%
   B) Able to confirm image through tilting rotating control panel when connecting to built-in camera
   C) Provide C-mount camera port at the outside

8.2. Stand

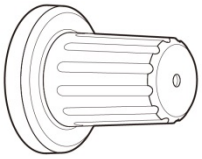
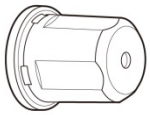
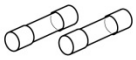
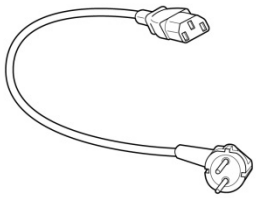
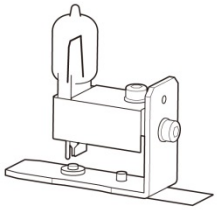
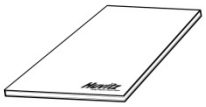
1) Mechanical performance
    A) Optical zone support arm
        (1) Length: 869mm
        (2) Rotating angle: 315 °
        (3) Vertical transfer distance: +336 ~ - 259 mm
    B) Stand's support arm
        (1) Length: 450mm
        (2) Rotating angle: 360°
    C) Stand's height: 1929 mm
    D) Base: 590 x 590mm (length x width)
    E) Caster: 4 x 100 mm
    F) Optical zone support arm's allowed maximum weight for the option: 5.0kg (optical zone's weight excluding option: 12.8kg)
    G) Total weight: approximately 224kg

2) Electric performance
    A) Power: INPUT: AC 100~240V, 50-60Hz, OUTPUT: 15V, 6.7A
    B) Consumption power: 232VA
    C) Control panel
        (1) LCD Type : 7inch Color TFT-LCD
        (2) Resolution: 800 x 480 pixels
        (3) Window Size : 165 x 104 mm



[Diagram 23. Stand]

9. Accessories

ITEM	Q'ty	ITEM	Q'ty
			
			
			
			
			

1. Power cable (AC 220V / 60Hz power code)
2. Dust cover
3. Fuse (2 X T 6.3 A)
4. Halogen lamp (12V / 50W)
5. Optical part's handle
6. PD / lighting shutter handle

⚠ WARNING

To prevent fire, replace with the fuse of the same type and class.
Fuse (2 X T 6.3 A)

10. EMC Information

Manufacturer announcement – electromagnetic waves trouble

Electromagnetic waves trouble		
HOM-700 should be used in the below mentioned electromagnetic wave environment. HOM-700 purchaser or user needs to confirm whether HOM-700 is used in this type of environment.		
Trouble test	**Question of appropriateness**	**Electromagnetic wave environment – guideline**
Radioactivity trouble KS C CISPR 11	Type 1	HOM-700 uses RF energy merely to carry out internal function. Accordingly, RF radiation is very low, and there is a low possibility that the electric device of the surrounding will be intercepted.
Radioactivity trouble KS C CISPR 11	Class B	HOM-700 is suitable for all the facilities by logging into the public low voltage power network that is supplied within building for residential facility and for own usage.
Harmonic wave trouble KS C IEC 61000 – 3 – 2	Class A	
Voltage agitation/flicker trouble KS C IEC 61000 – 3 – 3	Application	

Manufacturer announcement – electromagnetic waves tolerance

electromagnetic waves tolerance			
HOM-700 is to be used in the below designated electromagnetic wave environment. HOM-700 customer and user need to guarantee that the HOM-700 will be used in this type of environment.			
Tolerance test	**KS C IEC 60601 test level**	**Appropriateness level**	**Electromagnetic wave environment – guideline**
Electrostatic discharge(ESD) KS C IEC 61000 – 4 – 2	contact ±6 kV in the air ±8 kV	contact ±6 kV in the air ±8 kV	Floor should be made of wood, concrete or ceramic tile. floor When covered with synthetic material, relative humidity level should be at least 30%.
Electric rapid transients/bust KS C IEC	power supplying line ±2 kV	power supplying line ±2 kV input/output line	quality of power should be for typical commercial electricity or hospital

61000 – 4 – 4	input/output line ±1 kV	±1 kV	power level.
Surge KS C IEC 61000 – 4 – 5	between lines ±1 kV between line and grounding ±2 kV	differential mode ±1 kV common mode ±2 kV	quality of power should be of typical commercial electricity or hospital power level.
Voltage dip, instantaneous interruption, voltage fluctuation at the power input line KS C IEC 61000 – 4 – 11	For 0.5 cycle < 5 %*U*T(*UT's* > 95 % decrease) For 5 cycle 40 %*U*T(*UT's* 60 % decrease) For 25 cycle 70 %*U*T(*UT's* 30 % decrease) For 5 seconds < 5 % *U*T(*UT's* > 95 % decrease)	For 0.5 cycle < 5 %*U*T(*UT's* > 95 % decrease) For 5 cycle, 40 % *U*T(*UT's* 60 % decrease) For 25 cycle, 70 %*U*T(*UT's* 30 % decrease) For 5 seconds, < 5 % *U*T(*UT's* > 95 % decrease)	quality of power is set to typical commercial power or hospital power level. If HOM-700= user needs continuous operation even when power is stopped, it is recommended that HOM-700 is supplied with power with uninterruptible power device or battery.
Power frequency magnetic field (50/60 Hz) KS C IEC 61000 – 4 – 8	3 A/m	3 A/m	If image distortion results, it may be necessary to separate HOM-700 far from the source of power frequency magnetic field generation. It is necessary that the system is measured at the designated installation location to be sure that power frequency magnetic field is sufficiently low.
Other *U*T is the a.c. power voltage for before approving the test level.			

Electromagnetic waves tolerance			
HOM-700 is to be used in the below mentioned electromagnetic wave environment. HOM-700 purchaser or user needs to confirm whether HOM-700 is sued at this environment.			
Tolerance test	**KS C IEC 60601 test conditions**	**Appropriateness level**	**Electromagnetic wave environment – guideline**
Conductivity RF electromagnetic field KS C IEC 61000 – 4 – 6	3 Vrms 150 kHz ~ 80 MHz	3 Vrms	As for the portable or movable communication device, this is the equation that is applied to the transmitter frequency, and it should not be used closer than the separation distance calculated with the equation that is applied to transmitter frequency when it comes to any of the HOM-700 that includes cable Recommended separation distance $d = 1.2\sqrt{P}$ $d = 1.2\sqrt{P}$ 80 MHz ~ 800 MHz scope $d = 2.3\sqrt{P}$ 800 MHz ~ 2.5 GHz scope Here, P is the watt(W) that transmitter Manufacturer disclosed, and this is the indicated transmitter maximum output power rated value. D is the recommended separation distance indicated with (m). Electric intensity of the fixation RF transmitter decided by electromagnetic wave environment's field inspection should be less than appropriateness level at each of the frequency range. B.
Radioactivity RF electromagnetic field tolerance KS C IEC 61000 – 4 – 3	3 V/m 80 MHz ~ 2.5 GHz scope	3 V/m	

			Trouble may occur near the medical device that is indicated with the following symbol.
Other 1 At the 80 MHz and 800 MHz, apply frequency range towards the increasingly higher side. Other 2 This guideline cannot be applied to all situations because diffusion of electromagnetic waves are affected by absorption and reflection by structure, object and human beings.			
It is difficult to carry out precise theoretical forecasting when it comes to the electric intensity that is generated at the fixation transmitter such as a wireless phone(vehicle phone/phone with no code)'s base station and land mobile wireless, amateur wireless, AM and FM broadcast and TV broadcast. Field inspection should be carried out in order to evaluate electromagnetic wave environment based on fixation RF transmitter. It is necessary to observe and to verify whether model 006 operates normally if electric intensity measured at the location where model 006 is used, exceeds appropriateness level of the RF that can be applied. If the abnormal operation is observed, it may be necessary to take on additional measures such as adjusting the direction in which model 006 and moving location. b Electric intensity at the 150 kHz～80 MHz's frequency range should be 3 V/m or less.			

Recommended distance for the separation of portable and mobile RF communication device and model 006			
HOM-700 is to be used in the electromagnetic wave environment where radioactivity RF trouble is controlled. HOM-700 purchaser or user can prevent electromagnetic waves trouble by maintaining minimum distance between portable and mobile RF communication device (transmitter) and HOM-700 as recommended below based on communication device's maximum output power.			
Transmitter's rating maximum output power W	**Separation distance suitable for transmitter frequency**		
	150 kHz ~ 80 MHz $d = 1.2 \sqrt{P}$	80 kHz ~ 800 MHz $d = 1.2 \sqrt{P}$	800 MHz ~ 2.5 GHz $d = 2.3 \sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23
Maximum output power that is not listed above can be decided by using the formula that can be applied to the applicable transmitter's frequency when it comes to the *P*(m) and recommended separation distance for the transmitter for rating. Here, *d* refers to the maximum output power rated value of the transmitter indicated with watt (W) disclosed by transmitter manufacturer. Other 1 Increasingly higher frequency range is applied to 80 MHz and 800 MHz. Other 2 This guideline cannot be applied to all situations because diffusion of electromagnetic waves are affected by absorption and reflection by structure, object and human beings. Other 4 This guideline cannot be applied to all situations because diffusion of electromagnetic waves are affected by absorption and reflection by structure, object and human beings.			

Electromagnetic waves tolerance			
HOM-700 is to be used at the electromagnetic wave environment designated below. HOM-700 customer and user need to guarantee that the HOM-700 will be used at this environment.			
Tolerance test	**KS C IEC 60601 testing conditions**	**Appropriateness level**	**Electromagnetic wave environment – guideline**
Conductivity RF electromagnetic field KS C IEC 61000 – 4 – 6	3 Vrms 150 kHz ~ 80 MHz	3 Vrms 150 kHz ~ 10 MHz	HOM-700 has minimum RF shield effect. As for each cable that comes into the shielded location, it should be used only at the shielded location; 80

Radioactivity RF electromagnetic field tolerance KS C IEC 61000－4－3	3 V/m 80 MHz～2.5 GHz	3 V/m 100 MHz～2.5 GHz	dB at 10 MHz～20 MHz frequency range, frequency range of 100 dB, 80 MHz～100 MHz at 20 MHz～80 MHz frequency range. Minimum value at the 20 MHz that has 80 dB minimum RF filter decrease is 100 dB. Minimum value at 80 MHz is 80 dB. This is fixation RF transmitter that is determined through electromagnetic wave environment field inspection. Electric intensity at the outside of the shielded location should be 3 V/m or less a. Trouble may result near the medical device where the following symbol is indicated.
Other 1 This guideline cannot be applied to all situations because diffusion of electromagnetic waves are affected by absorption and reflection by structure, object and human beings. Other 2 It is important to verify and to confirm whether actual shield effect and filter decrease of the shielded location satisfy the minimum specs.			
It is not easy to carry out precise theoretical forecasting when it comes to the electric intensity that results from the fixation transmitter such as a wireless phone(vehicle phone/phone with no code)'s base station, land mobile wireless, amateur wireless, AM and FM broadcast, TV broadcast. In order to evaluate the electromagnetic wave environment with fixation RF transmitter, field inspection is required. If the electric intensity used by the HOM-700 that is measured at the outside of the shielded location exceeds 3 V/m, then it is necessary to observe and verify whether HOM-700 operates normally. If abnormal operation is observed, then re-place HOM-700 or use other shielded location that has increasingly higher RF shield effect and filter decrease. Likewise, other additional measures may be needed.			

11. Service information

Receive service according to the following sequence listed below if the problem is problematic.

- First, take measure as mentioned in the repair guide of Chapter 9 depending on the type of problem.
- If there is other problem, then contact the distributor where you purchased the product.
- Before contacting the distributor, check the product's model number and serial number.
- Serial number is the number designated to each product, and you can find it at the back of the product. It is advised that you write it down on the following chart immediately after purchasing the product.
- This is the record on the purchase. Please keep this user manual. Please keep the receipt as an evidence for the purchase as well.

Date purchased: _____

Name of the distributor: _____

Distributor's address: _____

Distributor's contact number: _____

Model number: _____

serial number: _____

- If the distributor where you purchased the product cannot be contacted, then contact the **HUVITZ Co., Ltd.**'s Customer Service Department directly. Refer to the following for the contact number of the **HUVITZ Co., Ltd.**'s Customer Service Department.

HUVITZ Co., Ltd.'s contact numbers

Address: (HQs) HUVITZ Co., Ltd. 298-29 (Geumjeong-dong), Gongdan-ro, Gunpo-si, Gyeonggi-do, 435-862, Korea	Tel: 031-428-9100 (main) Fax: 031-477-9022(C/S) e-mail: svc@huvitz.com http://www.huvitz.com
Producer: HUVITZ Co., Ltd. 16-17 (Hogye-dong), 91-beongil, LS-ro, Dongan-gu, Anyang-si, Gyeonggi-do, 431-848, Korea	Tel: 031-428-9100 Fax: 031-477-8618

EU Representative

Medical Device Safety Service GmbH(MDSS)	Schiffgraben 41, 30175 Hannover, Germany **Tel**: +49-511-62628630 **Fax**: +49-511-62628633